FACT SHEET FOR NPDES PERMIT NO. WA-0023329
CITY OF RAYMOND WASTEWATER TREATMENT FACILITY

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APPENDICES

FACT SHEET FOR NPDES PERMIT NO. WA-0023329

INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) permits which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the state of Washington on the basis of RCW 90.48 which defines the Department of Ecology's (the Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), and water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least 30 days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

This fact sheet has been reviewed by the Permittee and errors in fact have been corrected. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments (Appendix D) will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION

Applicant:	City of Raymond 230 2nd Street Raymond, WA 98577
Facility Name and Address:	Raymond Wastewater Treatment Plant Armstrong Avenue (see Appendix D for location)
Type of Treatment:	Aerated Lagoon (Biolac)
Discharge Location:	Willapa River (RM 7.0) Latitude: 46° 41' 23" N. Longitude: 123° 44' 42" W.
Water Body ID Number:	WA-24-2020

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

History

The major portion of the City of Raymond's (the City/the Permittee) sewers were constructed in the period from 1910 to 1930. In the early years, all storm and sanitary flows discharged directly to the Willapa River. In the early 1960s, the City intercepted the numerous outfalls and installed interceptor sewers and a wastewater treatment plant (facility) to provide a minimum of primary treatment. Because of its age and material, the collection system was experiencing an infiltration and inflow (I/I) problem of over 20 million gallons per day (MGD). Through the U.S. EPA Clean Water Act of 1972 and with 90 percent state and EPA grant funding, the City replaced approximately 90 percent of the sewer mains and the treatment process. Since October 29, 1986, the City has been allowed to discharge secondary treated wastewater to the Willapa River under NPDES Permit No. WA-002332-9.

From the beginning, the treatment system did not function as expected, causing frequent violations of the permit limits. The original facility was designed for a flow of 0.67 MGD and a BOD_5 loading of 980 lbs/day. Although actual flow rates in winter were much higher than designed (2.5 MGD compared to a design of 0.67 MGD), the malfunction of the system was attributed to I/I and the use of inappropriate process design formulations. EPA agreed to fund redesign and construct modifications to the system. The modifications were completed in July 1990. The redesign did not recognize the higher dry weather flows. As part of the EPA grant agreement, there was a one-year period during which performance of the facility was evaluated against permit limits and design criteria.

As the rehabilitation work was underway, another expansion of capacity was planned to accommodate industrial wastewaters from the Port of Willapa Harbor. This plan proposed to increase flows to 0.72 MGD and capacity from 980 to 1,780 lb/day influent 5-day BOD with only a 12 lb/day increase in discharge. This additional removal capacity was to be accomplished through more aeration and better mixing with further subdivision of existing ponds (essentially, increasing the reaction rates and actual detention times by reducing short circuiting. The engineer claimed that the new technology will treat flows of 1.50 MGD. The plan was approved under the "new technology" provision of the Criteria for Sewage Works Design, based on the claims that the aeration/mixing system proposed is more efficient than a conventional systems.

In lieu of information from similar full-scale or pilot-scale installations, a certification from the designer was accepted. In accordance with the "new technology" provision, a provisional permit to operate for a period of 18 months was proposed to be granted. During this period, the Permittee was to ascertain the actual treatment capacity of the system. The permit was to be modified to reflect the proven actual treatment capacity and the expiration date was to be extended to the maximum five years from the effective date of the permit.

The permit was to be effective on July 2, 1991; however, the City had appealed the permit and delayed starting the required monitoring to determine treatment capacity and I/I reduction projects. The City and the Department met and agreed upon the conditions of the permit and the effective date was changed to July 2, 1992, with an expiration date of December 21, 1993. However, the City did not complete the monitoring to determine the treatment capacity nor submit the information to reissue the permit as required in the permit. Because of this, the City was issued a penalty with an Order. The City was placed on a sewer hook-up moratorium and given a compliance schedule, and the engineer's certification for the treatment design was revoked. Stipulation and Agreed Order of Dismissal (PCHB No. 94-213) rescinded the Order and Penalty, extended the permit and reinstated a new compliance schedule. **This permit is a**

replacement for the expired permit and is issued with requirements for monitoring and a limitation of treatment capacity.

Collection System Status

As noted above, most of the sewers were constructed between 1910 to 1930 and discharged directly to the Willapa River. In the 1960s, interceptors replaced the numerous outfalls and a treatment facility provided primary treatment. The collection system, because of its age and material, experienced I/I flows of over 20 MGD. In the late 1970s and early 1980s, the City replaced approximately 90 percent of the sewer mains and the treatment process.

The Raymond WWTP and collection system presently serves a population of about 2,500. The one major industrial discharger to the facility is the Port of Willapa Harbor. The Port has a pretreatment facility which treats the waste from the Protan industry. There are 14 pump stations throughout the City that pump all flows to the WWTP.

The existing collection system still experiences high flows due to I/I that exceeds the hydraulic capacity of the facility. These high flows cause the permit limits for BOD_5 and TSS to be violated. Order No. DE 93WQ-S328 was issued on February 4, 1993, and required the Permittee to complete the requirements of the permit in accordance with an agreed upon schedule. The Permittee adopted an Ordinance that requires the replacement of all side sewer laterals in the collection system. As of April 1996, approximately 60 percent of the laterals have been replaced.

Special condition S4.F. of the permit will contain a requirement to continue the side sewer replacement program. This program shall be completed prior to Department approval of the facility plan/engineering report (one year-three months from issuance date). If the side sewer replacement program has not achieved its I/I reduction goals, then an inflow and infiltration study of the "Old Main Line Sewers" area of the collection system shall be completed. The recommendations of this I/I study shall become part of the design and construction package for meeting compliance with the final effluent limitations.

Treatment Processes

The Raymond facility consists of a collection system with 14 pump stations for a design population of about 4,900 that also serves the Port of Willapa Harbor's pretreatment facility; all flows are pumped to the facility; influent structure; two parallel trains of three aerated ponds operated in series; "polishing" pond; chlorination disinfection basin followed by dechlorination; outfall pipe and diffuser that discharges to the Willapa River. The first stage lagoons and the polishing pond have a floating baffle located a mid length. The facility is designed for a dry weather flow of 0.72 MGD but is experiencing peak monthly and daily wet weather flows of 1.5 and 2.5 MGD, respectively. See Appendix D for schematic of process.

The collection system experiences high flows due to inflow and infiltration (I/I) that exceeds the hydraulic capacity of the facility. These high flows causes the permit limits for BOD_5 and TSS to be violated. An Order (No. DE 93WQ-S328) issued on February 4, 1993, required the Permittee to complete the requirements of the permit in accordance with an agreed upon schedule. Therefore, the Permittee adopted an Ordinance requiring the replacement of all side sewer laterals in the collection system.

The major industrial dischargers to the facility are the Port of Willapa Harbor, Rainbow Valley Landfill, and Weyerhaeuser. The Port has a pretreatment facility which treats the waste from the Natural Biopolymer, Inc. industry.

Discharge Outfall

Secondary treated and disinfected effluent is continuously discharged from the facility via a submerged 12-inch outfall with 2-4" diffusers into the Willapa River. The Raymond facility discharges to the Willapa River @ RM 7.00 about 1000 feet downstream of the confluence with the South Fork of the Willapa River. The facility is located on the north side of the Willapa River on Armstrong Avenue in the Riverdale area.

Residual Solids

Most of the solids in the aerated lagoons are removed through the biological process. Solids are also removed by settling in the partially aerated lagoons and polishing pond. The periodic removal and disposal of these solids from the lagoons, i.e., land applied, will require a permit from the Pacific County Health District.

Sludge Monitoring: This permit contains monitoring requirements for sludge quantity and quality prior to disposal. This requirement is necessary and justified in order to gain the information for disposal options. The data is required by 40 CFR 503 to implement the requirements of Section 405 of the Clean Water Act. This Act requires permitting of sludge generators and establishes restrictions on sludge uses. The parameters chosen to be monitored are those which may be pertinent to disposal of this sludge. Since the facility has been in operation for only ten years, sludge accumulation depths have not required removal.

Leachate Monitoring: This condition is supplementary to special condition S8 which requires characterization of non-domestic discharges.

PERMIT STATUS

The previous permit for this facility was issued on June 28, 1991. The City appealed the NPDES permit. The appeal was settled before the Pollution Control Hearings Board (PCHB No. 91-178) by Stipulation and Agreed Order of Dismissal. This Order was signed by the City and the Department and became effected on September 23, 1992. The issuance date of the permit was amended to July 2, 1992, with an expiration date of December 21, 1994. The original permit was limited to only 18 months due to the developmental technology of the proposed aeration system. On February 4, 1993, even though the treatment capacity had not been determined, the Department issued Order No. DE 93WQ-S328 and this provisional permit was modified. The Order was issued because the Permittee could not meet the compliance schedules for side sewer replacement as required in the provisional permit.

The previous permit contained the following effluent limitations:

Parameter	Monthly Average	Weekly Average
BOD_5	30 mg/L, 180 lbs/day	45 mg/L, 270 lbs/day
TSS	75 mg/L, 450 lbs/day	110 mg/L, 660 lbs/day
Fecal Coliform	200/100 ml	400/100 ml
pH	shall not be outside the range 6.0 to 9.0	

	Monthly Average	Daily Maximum
Chlorine, Total Residual	0.06 mg/L, 0.36 lbs/day	0.15 mg/L, 0.90 lbs/day
Total Ammonia (Nov-Apr)	25 mg/L, 150 lbs/day	50 mg/L, 300 lbs/day
(May-Oct)	7.5 mg/L, 45 lbs/day	15 mg/L, 85 lbs/day

An application for permit renewal was first submitted to the Department on January 26, 1994, but was not accepted. The application did not include representative sampling data and verification of treatment capacity, removal of excessive inflow and infiltration, outfall dilution study, and approved sludge disposal plan. After completion of the treatment capacity report, the Permittee submitted a new application on September 20, 1995, which was accepted by the Department on December 11, 1995.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection on June 26, 1995. A Class 2 inspection was conducted by the Environmental Investigations and Laboratory Services Program in September (dry weather) and December (wet weather) 1992.

During the history of the previous permit, the Permittee has not remained in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department. The following is a summary of the permit compliance for the period of November 1993 to October 1995:

Parameter	Permit Limit	Number of Exceedances
Design Flow	0.72 MGD	14
Wet Weather Flow	1.50 MGD	1
BOD5 (influent)	1780 lbs/day	2
TSS (influent)	1780 lbs/day	3
BOD5 (effluent)	30.0 mg/L	2
BOD5 (effluent)	180 lbs/day	3
BOD5 (effluent)	85 % Removal	7
Ammonia-N (May-Oct)	7.5 mg/L/15.0 mg/L	11/7 (mo. avg/daily max)
Ammonia-N (Nov-Apr)	25.0 mg/L	2 (mo. avg)

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The highest monthly average value of the effluent is characterized as follows:

Parameter	Concentration
Flow	1.743 MGD
pH	between 7.27 to 8.07 units
Fecal Coliform Bacteria	162/100 ml
BOD (5 day)	63.6 mg/L
Total Chlorine Residual	0.05 mg/L
TSS	34.1 mg/L
Ammonia (as N)	28.0 mg/L
Kjeldahl Nitrogen	19.9 mg/L
Nitrate (as N)	27.4 mg/L
Nitrite (as N)	25.4 mg/L
Phosphorus Total (as P)	4.78 mg/L
Dissolved Oxygen	6.66 mg/L to 10.1 mg/L

PROPOSED PERMIT LIMITATIONS AND CONDITIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), or Sediment Quality Standards (Chapter 173-204 WAC). The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

DESIGN CRITERIA

In accordance with Washington Administrative Code (WAC) 173-220-130(1)(a), effluent limitations shall not be less stringent than those based upon the design criteria for the facility, which are contained in approved engineering plans, reports, or approved revisions. Also, in accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from the approved (March 9, 1990) "Engineering Report for Domestic and Industrial Wastewater Treatment Facilities" prepared by Gray & Osborne, engineering consultants and are as follows:

Monthly average flow (max. month): ..... 1.50 mgd
Monthly average dry weather flow: ..... 0.48 mgd
Monthly average wet weather flow (Design): ..... 0.72 mgd
Instantaneous peak flow: ..... 2.50 mgd
*BOD influent loading: ..... 1780 lbs/day
TSS influent loading: ..... 1780 lbs/day
Design population equivalent: 4900

* Refer to the next Section "technology-based effluent limitations" for revision of the influent loading limit for BOD.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD_5, and TSS are taken from Chapter 173-221 WAC are:

pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria:	Monthly Geometric Mean = 200 colonies/100 ml Weekly Geometric Mean = 400 colonies/100 ml
BOD_5: (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration. Average Weekly Limit = 45 mg/L
TSS: (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration. Average Weekly Limit = 45 mg/L

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b):

Monthly BOD5 and TSS effluent mass loadings (lbs/day) were calculated as maximum monthly design flow (0.72 mgd) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit (180 lbs/day).

The weekly average effluent mass loading is calculated as 1.5 X monthly loading = 270 lbs/day.

In compliance with the requirements of special condition S11 of the current NPDES waste discharge permit for the City wastewater treatment plant and Administrative Order No. 94WQ-S302, a treatment plant capacity analysis was completed. The consultant's analysis was performed in November 1993 and again from May 1994 through February 1995. The lagoon modeling used the following complete-mix model and first-order reaction rate equation:

$$\% \text{ BOD}_5 \text{ Removed} = \frac{100(S_o - S)}{S_o} = \frac{100\ kt}{1 + kt}; \qquad k_{20}o_C = k_T(1.047)^{-(20-T)}$$

The results of the consultant's modeling was re-evaluated by using the EPA recommended statistical analysis (Normal Distribution method - TSD EPA/505/2/90-001, Appendix E). The 95 percentile probability reaction rate was determined to be 0.845 ¯day. This reaction rate, when plugged back into the

model, equates to an influent limit of 1100 lbs/day. This 1100 lbs/day influent loading limit will cause the following change to the effluent limit for BOD5:

Parameter	Monthly Average	Weekly Average
Biochemical Oxygen Demand (5 day)	30 mg/L, 165 lbs/day	45 mg/L, 248 lbs/day

The effluent limitations in the previous permit established for BOD and TSS were based on the effluent requirements for waste stabilization ponds of 30 mg/L and 75 mg/L (monthly average), respectively. These limitations were used because of the experimental nature of the treatment system (Biolac). However, WAC 173-221 requires these limitations to be adjusted after additional monitoring data have been collected to verify treatment capacities and efficiencies of the facility. WAC 173-221-050 (2) (c) requires the facility to meet effluent limitations "not any less stringent than effluent concentrations achievable through proper operation and maintenance of the wastewater facility based upon an analysis of the past performance." The following BOD_5 and TSS effluent concentrations and percent removals were determined from operational data collected over the past three years (1/93 through 12/95):

Parameter	**Monthly Average**	**Weekly Average**
May through October		
BOD_5	35.0 mg/L	52.5 mg/L
TSS	37.0 mg/L	55.5 mg/L
BOD_5 (% Removal)	70 %	
TSS (% Removal)	75 %	
November through April		
BOD_5	30.0 mg/L	45.0 mg/L
TSS	30.0 mg/L	45.0 mg/L
BOD_5 (% Removal)	75 %	
TSS (% Removal)	70 %	

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

Antidegradation

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the state Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a degradation of existing water quality or beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

Mixing Zones

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention and control (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Description of the Receiving Water

The facility discharges to the Willapa River (RM 7.00) which is designated as a Class A receiving water (with tidal influences) in the vicinity of the outfall. Other nearby point source outfalls include the City of South Bend (RM 3.5). Due to the geomorphology characteristics of the Willapa River, the area near the City was considered as resembling an estuary. Characteristic uses include the following:

> Water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.
>
> Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliform `	100 colonies/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTU above background
Toxics	No toxics in toxic amounts

Consideration of Surface Water Quality-Based Limits for Numeric Criteria

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

> Chronic and acute mixing zones are established as for a river having flow characteristics resembling an estuary (WAC 173-201A (7)(b) and (8)(a)).
>
> Chronic mixing zone shall not extend in any horizontal direction from the discharge ports for a distance greater than two hundred feet plus the depth of water over the discharge ports as measured at lower low water; and not occupy greater than twenty-five percent of the width of the water body measured during lower low water.
>
> Acute mixing zone shall not extend beyond ten percent of the distance towards the upstream and downstream boundaries of an authorized mixing zone, as measured independently from the discharge ports; not utilize greater than two and one-half percent of the flow; and not occupy greater than twenty-five percent of the width of the water body.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of a fluorescent DYE study with correlation to the PLUMES dilution model (study approved by the Department on January 12, 1996). The dilution factors have been determined to be: Chronic dilution at 76.7; Acute dilution at 19.7.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field

pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for the Willapa River is the seven day average low river flow with a recurrence interval of ten years (7Q10). Ambient data at critical conditions in the vicinity of the Raymond outfall was taken from data recorded at the Willapa Station (RM 17.7) which includes historical data for the years 1979 through 1992 and 1995. The ambient background data used for this permit includes the following from:

7Q10 low flow	18.3 cfs
Velocity	1.5 ft/sec
Depth	0.96 feet
Width	400 feet
Roughness (Manning)	n=0.039
Slope	0.00
Temperature	19.8^{o} C
pH (high)	7.9
D. Oxygen	10.2 mg/L
Total Ammonia-N	0.07 mg/L
Fecal Coliform	41/100 mL dry weather (>100/100 mL storm related)
Conductivity	72
Salinity	5 ppt
Turbidity	20 NTU
Hardness	26.3 mg/L as CaCO3
Lead	no data collected
Copper	no data collected
Zinc	no data collected
All Other Metals	no data collected

The impacts of dissolved oxygen deficiency, temperature, pH, fecal coliform, chlorine, ammonia, metals, and other toxics were determined as shown below, using the dilution factors described above.

BOD--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water. The travel time and distance to critical DO deficit (see Appendix C) downstream of the outfall will extend over approximately three tidal cycles. Therefore, the dissolved oxygen deficit effect will not occur as calculated.

Temperature and pH--The impact of pH and temperature were modeled using the calculations from EPA, 1988. The input variables were dilution factor 76.7, upstream temperature 21.3^{o}C, upstream pH 7.78, upstream alkalinity 21 (as mg $CaCO_3$/L), effluent temperature 20.5^{o}C, effluent pH of 6.0 to 9.0, and effluent alkalinity 100 (as mg $CaCO_3$/L).

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, the technology-based effluent limitations for pH was placed in the permit and temperature was not limited.

Fecal Coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 colonies per 100 ml and a dilution factor of 76.7.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: chlorine and ammonia. A reasonable potential analysis (see Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for chlorine and ammonia to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs from May through October. The parameters used in the critical condition modeling are as follows: acute dilution factor 19.7, chronic dilution factor 76.7, receiving water temperature 21.3 ^{o}C, receiving water alkalinity 35 (as mg $CaCO_3$/L).

Valid ambient background data was available for ammonia as N. Calculations using all applicable data resulted in a determination that there is no reasonable potential for this discharge to cause an ammonia as N violation of water quality standards. This determination assumes that the Permittee meets the other effluent limits of this permit. There is a concern over the NH3-N discharged from the Port of Willapa Harbor industrial pretreatment facility that makes it imperative that a limit for NH3-N be in this permit.

Effluent limits were derived for chlorine which was determined to have a reasonable potential to cause a violation of the Water Quality Standards. Therefore, the Permittee shall continue to utilize dechlorination of their final effluent prior to discharge to the Willapa River. Effluent limits were calculated using methods from EPA, 1991 as shown in Appendix C. The resultant effluent limits are as follows:

Parameter	Monthly Average	Daily Maximum
Chlorine (Total Residual)	0.10 mg/L	0.25 mg/L
Ammonia-Nitrogen (NH_3-N)	57.0 mg/L, 342 lbs/day	136.0 mg/L, 816 lbs/day

Schedule For Compliance

In accordance with S4. of the previous permit, the Permittee is required to ensure that the facility meets the effluent limitations and all design criteria. If the effluent limits are not met at the design flows and loadings, the Permittee is required to reduce flows and/or loadings to levels which effluent limits can be met. If effluent limits cannot be met and design criteria is continually being exceeded, the Permittee shall submit a plan to maintain capacity at the facility sufficient to achieve the effluent limitations and other

conditions of the permit. This plan must meet the requirements of WAC 173-240-060 "Engineering Report" and be approved by the Department prior to construction.

The Permittee shall meet the following schedule for compliance:

ITEM	COMPLETION DATE
Draft Engineering Report	(1 year from issuance)
Final Engineering Report	(1 year-3 months from issuance)
Draft Plans and Specifications	(2 years-3 months from issuance)
Final Plans and Specifications	(2 years-6 months from issuance)
Begin Construction	(2 years-10 months from issuance)
Completion of Construction	(4 years from issuance)
Compliance with Final Effluent Limitations	(5 years from issuance)

In accordance with the above schedule, the following limits shall apply until compliance with final effluent limitations:

INTERIM LIMITATIONS

May through October

Parameter	Monthly Average	Weekly Average
$CBOD_5$*	30 mg/L, 180 lbs/day	45 mg/L, 270 lbs/day
TSS*	40 mg/L, 240 lbs/day	60 mg/L, 360 lbs/day
Fecal Coliform	200/100 ml	400/100 ml
pH	shall not be outside the range 6.0 to 9.0	

Parameter	Monthly Average	Daily Maximum
Chlorine, Total Residual	0.10 mg/L, 0.60 lbs/day	0.25 mg/L, 1.50 lbs/day

* The average monthly effluent concentration for $CBOD_5$ shall not exceed 30 mg/L or 30 percent of the respective monthly average influent concentrations, whichever is more stringent. The average monthly effluent concentration for Total Suspended Solids shall not exceed 40 mg/L or 25 percent of the respective monthly average influent concentrations, whichever is more stringent.

November through May

Parameter	Monthly Average	Weekly Average
$CBOD_5$*	25 mg/L, 150 lbs/day	40 mg/L, 240 lbs/day
TSS*	30 mg/L, 180 lbs/day	45 mg/L, 270 lbs/day
Fecal Coliform	200/100 ml	400/100 ml
pH	shall not be outside the range 6.0 to 9.0	

Parameter	Monthly Average	Daily Maximum
Chlorine, Total Residual	0.10 mg/L, 0.60 lbs/day	0.25 mg/L, 1.50 lbs/day
Ammonia-Nitrogen (NH_3-N)	57.0 mg/L, 342 lbs/day	136.0 mg/L, 816 lbs/day

* The average monthly effluent concentration for BOD5 shall not exceed 30 mg/L or 25 percent of the respective monthly average influent concentrations, whichever is more stringent. The average monthly effluent concentration for Total Suspended Solids shall not exceed 30 mg/L or 30 percent of the respective monthly average influent concentrations, whichever is more stringent.

FINAL EFFLUENT LIMITATIONS

Parameter	Monthly Average	Weekly Average
$CBOD_5$*	25 mg/L, 180 lbs/day	40 mg/L, 240 lbs/day
TSS*	30 mg/L, 180 lbs/day	45 mg/L, 270 lbs/day
Fecal Coliform	200/100 ml	400/100 ml
pH	shall not be outside the range 6.0 to 9.0	

Parameter	Monthly Average	Daily Maximum
Chlorine, Total Residual	0.10 mg/L, 0.60 lbs/day	0.25 mg/L, 1.50 lbs/day

* The average monthly effluent concentration for $CBOD_5$ shall not exceed 25 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent. The average monthy effluent concentration for Total Suspended Solids shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.

Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent and, therefore, this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

In accordance with WAC 173-205-040, the Permittee's effluent has been determined to have the potential to contain toxic chemicals. The proposed permit contains requirements for whole effluent toxicity testing as authorized by RCW 90.48.520 and 40 CFR 122.44 and in accordance with procedures in Chapter 173-205 WAC. The proposed permit requires the Permittee to conduct toxicity testing for one year in order to characterize both the acute and chronic toxicity of the effluent.

If acute or chronic toxicity is measured during effluent characterization at levels that, in accordance with WAC 173-205-050(2)(a), have a reasonable potential to cause receiving water toxicity, then the proposed permit will set a limit on the acute or chronic toxicity. The proposed permit will then require the

Permittee to conduct WET testing in order to monitor for compliance with either an acute toxicity limit, a chronic toxicity limit, or both an acute and a chronic toxicity limit. The proposed permit also specifies the procedures the Permittee must use to come back into compliance if the limits are exceeded.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{50}, etc. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

When the WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water toxicity, the Permittee will not be given WET limits and will only be required to retest the effluent prior to application for permit renewal in order to demonstrate that toxicity has not increased in the effluent.

If the Permittee makes process or material changes which, in the Department's opinion, results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the permit renewal. Toxicity is assumed to have increased if WET testing conducted for submission with a permit application fails to meet the performance standards in WAC 173-205-020, "whole effluent toxicity performance standard." The Permittee may demonstrate to the Department that changes have not increased effluent toxicity by performing additional WET testing after the time the process or material changes have been made.

Human Health

The Department has determined that the applicant's discharge does not contain chemicals of concern based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the human health criteria.

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

Priority Pollutant Scan

The Permittee lacks any information on pollutants of concern in the effluent from the WWTP and in the receiving water upstream of the outfall. As part of the proposed permit, the Permittee is required to collect samples of the effluent and receiving water for analysis. The samples shall be analyzed for priority pollutants (particular reference should be made to the following metals: arsenic, copper, cadmium, lead, mercury, silver, and zinc). If any pollutants of concern are detected in the effluent, the Permittee shall collect additional samples (at least ten, for reliability) to verify the amount of concentration and to calculate the reasonable potential to exceed water quality criteria. Determination of

the receiving water hardness is also required for calculating water quality criteria and permit limits for metals.

EPA has approved, on a case-by-case basis, the use of chemical method 200.8 (ICP-MS) for metals. If the Permittee should elect to use this test method, a letter requesting so shall be submitted to the Department to EPA for concurrence. The results of the sampling analysis shall be considered during the development of the engineering report.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT
(ISSUED JULY 2, 1991)

Parameters	Existing Limits	Proposed Limits
BOD5, monthly average	180 lbs/day	165 lbs/day
BOD5, weekly average	270 lbs/day	248 lbs/day
TSS, monthly average	75 mg/L, 450 lbs/day	30 mg/L, 375 lbs/day
TSS, weekly average	110 mg/L, 660 lbs/day	45 mg/L, 563 lbs/day
Chlorine (Total Residual), monthly average	0.06 mg/L, 0.36 lbs/day	0.10 mg/L, 0.60 lbs/day
Chlorine (Total Residual), daily maximum	0.15 mg/L, 0.90 lbs/day	0.25 mg/L, 1.50 lbs/day
Total Ammonia (as N), monthly average (May-Oct)	7.5 mg/L, 45 lbs/day	no limit proposed
Total Ammonia (as N), daily maximum (May-Oct)	15 mg/L, 85 lbs/day	no limit proposed
Total Ammonia (as N), monthly average (Nov-Apr)	25 mg/L, 150 lbs/day	no limit proposed
Total Ammonia (as N), daily maximum (Nov-Apr)	50 mg/L, 300 lbs/day	no limit proposed

Biochemical Oxygen Demand (5 Day)

As part of the previous permit conditions, the Permittee was required to complete an analysis to determine the treatment capacity of the new technology proposed (BIOLAC). The Permittee submitted the treatment capacity report dated March 31, 1995. The Department's subsequent review and analysis of this report and the included data determined that the treatment capacity of the facility is limited to 1100 lbs/day of influent BOD5. Because of the 85 percent removal requirement (WAC 173-221-040), the effluent discharge loading was reduced (monthly average: 1100 lbs/day x 0.15 = 165 lbs/day; weekly average: 165 lbs/day x 1.5 = 248 lbs/day).

Total Suspended Solids

A review and analysis of the Discharge Monitoring Reports (DMRs) over the last two years shows that the treatment system is capable of meeting reduced limits for TSS. In accordance with WAC 173-221-050(2)(b) and utilizing EPA methodology in the TSD ("Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001) Appendix E), the effluent from the treatment system has "consistently achieved less than 30 mg/L TSS (WAC 173-221-030(11)(a). (monthly average: 30 mg/L x 1.5 MGD x 8.34 = 375 lbs/day; weekly average: 30 mg/L x 1.5 = 45 mg/L & 45 x 1,5 x 8.34 = 563 lbs/day).

Chlorine (Total Residual)

The Permittee completed a mixing (dilution) zone study (October 1995) as per Administrative Order No. 94 WQ-S302 and submitted to the Department for review and approval. The study determined the acute and chronic dilution factors as follows: acute at 19.7:1 (ACEC = 5.0 percent); chronic at 76.7:1 (CCEC = 1.3 percent). Water quality-based effluent limits were calculated by the two-value wasteload process as described on page 100 of the TSD (EPA, 1991) and shown in Appendix C.

MONITORING AND REPORTING

Effluent monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for priority pollutants (Table VII-4 of the Permit Writers Manual, Publication Number 92-109, or 40 CFR 122 Appendix D) are being required to further characterize the effluent. The existence of priority pollutants could have a significant impact on the quality of the surface water.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring and testing schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the Department Permit Writer's Manual for (insert type of treatment facility). This frequency of monitoring is considered to be the minimum frequency to document compliance.

OTHER PERMIT CONDITIONS

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4. restricts the amount of flow.

SIX YEAR PLANNING REPORT

In accordance with permit special condition S12. and the Stipulation and Agreed Order of Dismissal (PCHB No. 94-213), the Permittee shall initiate a six year planning process with South Bend and Pacific County to evaluate regional sewage needs. The planning process shall determine needed treatment capacity for the range of users including residential, commercial, industrial, septage, and landfill leachate. The Permittee shall, by January 31, 2001, submit a report to the Department identifying a regional program for capital treatment and collection systems.

SIDE SEWER REPLACEMENT PROGRAM

Pollution Control Hearings Board's Stipulation and Agreed Order of Dismissal (PCHB No. 94-213) requires the Permittee to comply with the schedule for side sewer replacement described in the Administrative Order DE 93 WQ-S328. However, the Permittee has not complied with this schedule for completion of the side sewer replacement in the Lower Peters, Cherry Street, Riverdale, Business District, Island, and Riverview areas as required by the PCHB Order. Therefore, the proposed permit requires the Permittee to complete the required side sewer replacement program prior to approval of the Engineering Report (see above, Schedule for Compliance). The Engineering Report (ER) shall include the required analysis of the completed side sewer replacement program. If the analysis of the side sewer replacement program demonstrates that the required reduction in influent flows to the WWTP has not achieved, the ER shall include additional inflow and infiltration monitoring of the "Old Main Line" areas. The recommendations in the approved ER shall include, if the cost effectiveness analysis determines it feasible, implementation of an "Old Main Line Sewers" replacement project.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Permittee is required in permit condition S7. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503. The disposal of other solid waste is under the jurisdiction of the Pacific County Health Department.

PRETREATMENT

An industrial user survey is required to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations (40 CFR Part 403 and Sections 307(b) and 308 of the Clean Water Act), with state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC), and with local ordinances.

OUTFALL EVALUATION

Proposed permit condition S12. requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to determine if sediment is accumulating in the vicinity of the outfall.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five years.

REVIEW BY THE PERMITTEE

A proposed permit was reviewed by the Permittee for verification of facts. Only factual items were corrected in the draft permit and fact sheet.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on January 3, 1996, in the *Willapa Harbor Herald* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6279, or by writing to the address listed above.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Class 1 Inspection--A walk-through inspection of a facility that includes a visual inspection and some examination of facility records. It may also include a review of the facility's record of environmental compliance.

Class 2 Inspection--A walk-through inspection of a facility that includes the elements of a Class 1 Inspection plus sampling and testing of wastewaters. It may also include a review of the facility's record of environmental compliance.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time

intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Daily Maximum Discharge Limitation--The greatest allowable value for any calendar day.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of rainfall-caused surface water drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Mixing Zone--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

Monthly Average Discharge Limitation--The average of the measured values obtained over a calendar month's time.

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these

permits. NPDES permits issued by Washington state permit writers are joint NPDES/State permits issued under both state and federal laws.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

BIOCHEMICAL OXYGEN DEMAND (BOD)

The Streeter-Phelps Model is a mathematical model used to predict dissolved oxygen depletion in a receiving water as a result of a discharge of BOD. The variables used for this model are as follows:

INPUT

1. EFFLUENT CHARACTERISTICS

Discharge (cfs): 1.11
CBOD5 (mg/L): 19.9
NBOD (mg/L): 5.0
Dissolved Oxygen (mg/L): 8.10
Temperature (deg C): 21.3

2. RECEIVING WATER CHARACTERISTICS

Upstream Discharge (cfs): 18.3
Upstream CBOD5 (mg/L): 0.0
Upstream NBOD (mg/L): 0.2
Upstream Dissolved Oxygen (mg/L): 10.2
Upstream Temperature (deg C): 21.6
Elevation (ft NGVD): 0.00
Downstream Average Channel Slope (ft/ft): 0.00088
Downstream Average Channel Depth (ft): 19.8
Downstream Average Channel Velocity (fps): 0.66

3. REAERATION RATE (Base e) AT 20 deg C (day^-1): 0.07

Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested values
Churchill	1.5 - 6	2 - 50	0.03
O'Connor & Dobbins.	1 - 1.5	2 - 50	0.07
Owens	.1 - 6	1 - 2	0.05
Tsivoglou-Wallace	.1 - 6	.1 - 2	2.41

4. BOD DECAY RATE (Base e) AT 20 deg C (day^-1): 2.41

Reference	Suggested Value
Wright and McDonnell, 1979	2.41

OUTPUT

1. INITIAL MIXED RIVER CONDITION

CBOD5 (mg/L): 1.1
NBOD (mg/L): 0.5
Dissolved Oxygen (mg/L): 10.10
Temperature (deg C): 21.6

2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)

Reaeration (day^-1): 0.07
BOD Decay (day^-1): 2.59

3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU

Initial Mixed CBODU (mg/L): 1.7
Initial Mixed Total BODU (CBODU + NBOD, mg/L): 2.2

4. INITIAL DISSOLVED OXYGEN DEFICIT

Saturation Dissolved Oxygen (mg/L): 8.814
Initial Deficit (mg/L): ..... -1.27

5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days): 1.75

6. DISTANCE TO CRITICAL DO CONCENTRATION (miles): ... 18.95

7. CRITICAL DO DEFICIT (mg/L):0.82 (@ 7.0 miles Deficit = 0.30 mg/L)

8. CRITICAL DO CONCENTRATION (mg/L): 8.00

AMMONIA-N CRITERIA

AMMONIA-N AND TOTAL CHLORINE RESIDUAL LIMITS

APPENDIX D--MAPS AND DRAWINGS

VICINITY MAP

CONTOUR/LOCATION MAP

WWTP SITE PLAN

APPENDIX E-RESPONSE TO COMMENTS

The following are responses from the Department of Ecology (the Department), Southwest Regional Office, to comments submitted by the City of Raymond (the City) ((letter dated November 22, 1996) on the draft permit dated September 26, 1996:

1. Permit page 7, paragraph S1.A Interim Effluent Limitations.

   Agree, the weekly effluent limitation for BOD_5 is changed to 52.5 mg/L. The $CBOD_5$ limit would be 5 mg/L less (see response to Item 4, below for substitution of $CBOD_5$ in lieu of BOD_5) at 47.5 mg/L.

2. Permit page 7, paragraph S1.A Interim Effluent Limitations.

   The interim effluent limitations for TSS were determined in accordance with WAC 173-221-030(11), "effluent concentrations consistently achievable through proper operation and maintenance" means (a) "For a given pollutant parameter, the 95th percentile value for the thirty-day average effluent quality achieved by a wastewater facility in a period of at least twenty-four months (Permit Writer's manual recommends 36 months of data), excluding values attributable to equipment failures, operational errors, overloading, and other unusual conditions."

   <u>May through October</u>

   Fact Sheet page 8, explains that a review of the DMR data for the past three years (1/93 through 12/95) showed that the 95th percentile of the average monthly effluent BOD_5 concentration was equal to 37 mg/L. I have included the latest DMR data for 1996 and calculated the 95 percentile value for the past 24 months to also be 37 mg/L. Therefore, the $CBOD_5$ limit would be 32 mg/L.

   A review of the DMR data for just the months of May through October for the years 1994 through 1996 shows the 95 percentile value for TSS to be approximately 39 mg/L. Therefore, the Department has agreed to include the latest data and revise the Interim Effluent Limitations for the average monthly TSS effluent limitation to 39 mg/L (average weekly = 59 mg/L).

   <u>November through April</u>

   A review of the DMR data for the months of November through April for the years 1991 through 1996 shows that the average monthly TSS effluent concentrations have never exceeded 30 mg/L.

3. Permit page 7, paragraph S1.A Interim Effluent Limitations.

   Agree. No change required.

4. Permit page 2 (7?), paragraph S1.A (Interim Effluent Limitations) and permit page 8, paragraph S1.B (Final Effluent Limitations).

   Agree, this change will be made to reflect that allowed by WAC 173-221-050(6)(b) and the previous submittal of DMR data that included additional $CBOD_5$ and ammonia data in support of the request. However, the effluent limitations for $CBOD_5$ will be reduced by 5 mg/L from the BOD_5 limitation in accordance with WAC 173-22`1-050(6)(a).

5. Permit page 7, paragraph S1.A Interim Effluent Limitations, page 8, paragraph S1.B Final Effluent Limitations, and page 10, paragraph S2 Testing Schedule.

   Agree with the determination that no effluent limit for ammonia (NH_3-N) be included in the permit section S1.A. However, there is a need to monitor for ammonia (NH_3-N) in the effluent for the following reasons:

   a. The 1996 Washington State Water Quality Assessment, Section 305(b) Report indicates a problem with dissolved oxygen (DO) in the Willapa River.

   b. Since ammonia is toxic in the receiving water, it is important that this potential be monitored due to the past history of the industrial pretreatment facility. The history shows that there is a potential for change of ownership of the major contributor to this facility and the possibility that the ammonia levels may also change.

   c. The facility is required to provide treatment levels and proper operation and maintenance consistent with AKART (All Known Available and Reasonable Treatment) in accordance with RCW 90.48 and WAC 173-221. This will require the City through the Operation and Maintenance Manual to monitor process control that should include ammonia (Table XIII-2J of the Permit Writers Manual). This also provides the City protection from a third party law suit by identifying high levels of ammonia prior to discharge to the receiving water.

6. Permit page 8, paragraph S1.B Final Effluent Limitations.

   No changes to the percent removal requirements for TSS or $CBOD_5$. See sections below titled "Percent Removal for $CBOD_5$" and "Percent Removal for TSS." The on-going negotiations with the City during the last few years was over the existing permit conditions and the ability of the WWTP in meeting the limits in the approved design report. The ability of the treatment system to meet these limits were challenged at that time. The City's design engineering consultant certified the design to the Department as capable of meeting the limits established in the permit.

   The reasons for establishing Interim Limits, based on what the existing facility is consistently achieving through proper operation and maintenance, is to give the City time to plan, design, and construct what is needed to bring the facility up to the original design and to meet the Final Effluent Limitations in the permit.

   Percent Removal for $CBOD_5$

   For lagoons discharging flows less than 2.0 MGD to surface waters, the Department defined AKART limits as 30 mg/L for BOD_5 with 85 percent removal and to minimize TSS. All designs for new and upgraded lagoons must achieve these limits. Therefore, the Raymond WWTP was designed to achieve a BOD_5 effluent concentration and percent removal of 30 mg/L and 85 percent, respectively. The facility was also designed to minimize TSS discharged in the effluent. Therefore, the performance of the City's collection and WWTP lagoon system shall be upgraded to the approved and certified levels of design.

   However, before the Department can grant any alternative effluent limits, all of the requirements of WAC 173-221-050(5) must first be met. The facility upgrade was originally designed to meet a BOD_5 average monthly effluent limit of 30 mg/L with 85 percent removal. The existing permit has conditions that require reductions of flow and loadings to bring the facility effluent limits into

compliance. Therefore, all of below conditions shall be met prior to any alternative limits identified in WAC 173-221-040(2) can be approved.

WAC 173-221-050 (5) This section applies to the request for alternative limits and are additional requirements that must be met to receive reduced limits based on WAC 173-221-050 (2). All of the following items must be met prior to approval:

a. The effluent shall not cause water quality violations; and

The DMRs have shown past violations of the permit limits for BOD_5, total chlorine residual, and ammonia. However, the effluent discharged over the last two years have shown a definite improvement.

b. The permittee shall identify concentrations consistently achievable through proper operation and maintenance; and

This requirement is shown as the Interim Effluent Limitations in S1.A which are based on what the facility can consistently achieve. This in fact shows that the facility cannot accept loadings that it was originally designed to treat.

c. The permittee shall demonstrate that industrial wastewater does not interfere with the domestic wastewater facility; and

The DMR data (February 1994 through October 1996) does not show a significant contribution from the Port of Willapa Harbor pretreatment facility (Natural Biopolymer, Inc.). The City, therefore, could show that the industrial wastewater does not interfere. However, history has shown that the ownership of the one industry that discharges to the Port pretreatment facility changes frequently. History has also shown that when ownership changes, discharges to the Port facility also changes due to operation of the industry. These changes will affect the treatment efficiencies of the pretreatment facility.

d. The facility must be within the hydraulic and organic design capacity; and

This requirement has not been met due to the excessive I/I in the collection system. The WWTP was originally designed for a hydraulic capacity equal to an average wet weather flow of 0.72 MGD. The actual average wet weather is 1.08 MGD with an average discharge flow for the maximum wet month equal to 1.74 MGD. Peak daily flows exceed 2.5 MGD.

e. The permittee must complete an analysis of whether seasonal alternative effluent limits are more appropriate than year-round; and

This requirement may help them or may not help them. Summer and winter flows have there own unique problems. Winter flows and low temperatures decrease treatment efficiencies. However, summer low flow, detention times, and algae growth will also decrease treatment efficiencies. This is reflected in the Interim Effluent Limitations. The facility is discharging BOD_5 less than 30 mg/L in the winter but not meeting the percent removal; and vice versa, in the summer. However, the Final Effluent Limitations can be changed to seasonal limits if and when the facility is upgraded to meet design.

f. The facility must be able to meet all the other permit requirements and conditions.

There is no other permit requirements and conditions other than flows and loadings that the facility cannot meet. However, the original design was for a flow of 0.72 MGD and BOD_5 and TSS loadings of 1780 lbs/day. Even if the influent loadings are down now and the effluent will be less than a mass loading limit based on 15 percent of the original loading (267 lbs/day), the fact is that the facility cannot handle an influent loading of 1780 lbs/day and achieve 85 percent removal of these loadings.

Percent Removal for TSS

The interim permit limits for average monthly TSS percent removal are based on the actual performance of the facility. Since the analysis uses DMR data for the last three years and the actual performance of the facility has improved, the facility should have no trouble in meeting the percent removal requirement. However, (as stated above) the effluent limitations stated in WAC 173-221-040(1) shall be required as Final Effluent Limitations until the recommendations in a Department approved engineering report have been completed. Prior to changes to the Final Effluent Limitations, the City must demonstrate the following:

a. That changes to the original design are warrented. For example, changes to influent flows and/or loadings and corresponding changes to the effluent discharged.

b. The recommendations in the approved engineering report are required by regulation and sound engineering logic.

c. If no construction, operation, or maintenance changes are recommended, the facility must meet Final Effluent Limitations upon approval of the engineering report.

d. However, if changes are recommended, then additional monitoring data may be required to verify the design or O&M changes. Until such time that the facility is brought up to the design levels, additional DMR data is needed to determine what average monthly effluent levels of $CBOD_5$ and TSS the facility can consistently achieve.

7. Permit page 9, paragraph S1.C Compliance Schedule.

   The Engineering Report would have to include supporting documentation for meeting the original design. However, if the final recommendations in the Department approved Engineering Report does not include design and construction of additions or modifications to the facility, than the requirements of the permit would be met. A following statement will be added to Condition S1.C:

   > "If the recommendations in the final Engineering Report are approved by Ecology and does not require additional design or construction, the schedule for the plans and specification and construction items shall be considered in compliance with the intent of this permit section."

8. Permit, page 10, paragraph S2. Testing Schedule.

   Table XIII-1C of the Permit Writer's Manual has established minimum monitoring schedules for sewage lagoons discharging greater than 0.5 MGD to surface waters. The table has established a minimum testing schedule for flow, BOD_5, TSS, pH, fecal coliform, and total chlorine residual. Therefore, the permit will be changed to be in agreement with the minimum requirements as established. These testing schedules will be consistent with the requirements established in NPDES permits issued by the Department.

9. Fact Sheet page 4, Residual Solids.

   Thank you, the changes will be made.

10. Fact Sheet page 14, Final Effluent Limitations.

    Excuse the confusion with the Final Effluent Limitations. The Final Effluent Limitations shall be equal to the Effluent Limitations established in WAC 173-221-040(1) (see explanation in Item 6, above). The proposed permit will include exceptions for the limits for chlorine and the parameter $CBOD_5$ at 25 mg/L will be substituted for BOD_5 at 30 mg/L.

11. Fact Sheet page 17, Total Suspended Solids.

    Thank you again, the changes will be made.

12. Permit page 26, paragraph S13. Outfall Evaluation.

    See page 6 of the permit. The outfall evaluation shall be submitted with the next permit application, 180 days prior to expiration of the permit. The submittal date will be added to the permit when it is finally issued.

WEYERHAEUSER COMPANY

The following are responses from the Department of Ecology, Southwest Regional Office, to comments submitted by the Weyerhaeuser Company (letter dated November 22, 1996) on the draft permit dated September 26, 1996 (these comments were received by the Department after the final comment acceptance date):

COMMENT: 2nd paragraph (Special Condition S4.) -- General comments in support of the City of Raymond being allowed to accept "new wastewater sources into the system."

> Weyerhaeuser may have an interest in reviving a State wastewater permit application to direct our kiln and boiler blowdown wastewaters to the POTW.
>
> It is conceivable (and maybe likely) that the City of Raymond will choose to upgrade its system to create additional capacity. This would necessitate a shift in the hydraulic and mass discharge limits above those proposed as "Final Effluent Limitations." (Note: the assumption here is that these are not water quality-based limits.)
>
> The draft permit seems to lack a mechanism for re-setting the Final Effluent Limits in the event Raymond chooses this option. Permit language should be added to accommodate this possibility.

RESPONSE: No change required. Modification or reissuance of a permit for any cause is covered in General Condition G9. Since the City has not indicated at the time of the permit application what action they will be taking, the permit must be written as proposed. However, if the City does later on decide to take an action that will effect the treatment efficiencies of the facility, they can submit a new application to revise the permit.

COMMENT: A discrepancy exists between the draft permit and fact sheet on the final BOD and TSS mass discharge limits. The permit indicates Monthly Average limits of 267 lbs/day each, while the Fact Sheet indicates limits of 165 lbs/day. Given the reasoning offered for setting the limits (15 percent of the original design loading of 1780 lbs/day), it appears the higher number is appropriate.

RESPONSE: See response to the City's comment number 10 above.

DEPARTMENT OF NATURAL RESOURCES

The following are responses from the Department of Ecology, Southwest Regional Office, to comments submitted by the Department of Natural Resources (letter dated November 27, 1996) on the draft permit dated September 26, 1996 (these comments were received by the Department after the final comment period acceptance date):

COMMENT: ...understanding...and from a review of Ecology's files for this site is that: an assessment of the status of source control has been performed consistent with WAC 173-204-400(2); and a screening-level evaluation has been performed consistent with WAC 173-204-400(1)(a): (3); (4); (6). The results of these evaluations indicate that there is no reasonable potential for sediment impacts in violation of SMS.

RESPONSE: No change required. The development of special conditions for new permits and reissuance of permits require an initial screening to show if a reasonable potential for sediment impacts exist. The guidelines for this evaluation were originally developed and available as "Sediment Source Control Standards User Manual" dated 1993. The Permit Writer's Manual was recently updated to include the latest versions of these guidelines.